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AUTHORS: Sachse, G. and Leibnitz, E.

TITLE: The purification of radioactive waste solutions with natural inorganic ion exchangers; 3rd communication: the exchange absorption of cerium, ruthenium and zirconium complexes on Radgendorf clay

PERIODICAL: Kernenergie, no. 2, 1962, 114-117. (German)

TEXT: Experiments were carried out to evaluate the suitability of local bentonite clay for purification of radioactive waste solutions.  $Ce^{3+}$  ions were found to be taken up rapidly and the rate of the attainment of equilibrium was independent of the ion concentration. This is interpreted as meaning that the rate determining step in the absorption is the transfer of the ions from the solu-

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to the solid. The (apparent) exchange capacity of the Radgendorf clay for  $Ce^{3+}$  is pH-dependent in the acid range. At pH of 4 - 5 1.6 meq/g of clay can be taken up, partly due to deposition of  $Ce(OH)_3$  on the clay, and partly to the selective properties of the clay's surface. Up to 185 curies of carrier-free cerium ions can be absorbed on every gram of clay. Breakthrough curves of  $Ru^{103}$  in the form of nitrosyl complexes in 3 N nitric acid showed on the average, an escape of 11% of the activity. Of this amount over 80% was subsequently recovered on anion exchangers. The performance of the clay in the absorption of ruthenium from 0.75 N solutions, where one would expect less of the material to be in the form of neutral complexes, was also unsatisfactory, probably due to the formation of radioactive colloids. The complete retention of

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$Zr^{95}$  from dilute (0.5N) nitric acid solution and the better than 50% retention in 3N  $HNO_3$  is attributed to absorption of colloidal hydrolytic products and not to true ion exchange processes. This is due to the highly dispersive form of the Radgendorf clay.

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